Ordering number : ENA0323

SANYO Semiconductors

DATA SHEET

Monolithic Linear IC

LA4919N — Two-Channel 10W BTL High-Efficiency TV Audio Output Power Amplifier

Overview

The LA4919N is a 2-channel 10W BTL high-efficiency power amplifier. By using a signal following switching system for the power supply to the amplifier output stage and by including a nonlinear amplifier in the signal system, the LA4919N holds the number of external components to a minimum and reduces the power consumption (thermal loss) in the operating range to one half that of earlier class B power amplifiers.

The use of a DIP-28H package obviates the need for a separate heat sink and can contribute to internal space savings in end products.

Features

- High-efficiency 2-channel × 10W BTL power amplifier (V_{CC} = 15V, R_L = 8Ω)
- Provided in a DIP-28H package (no heat sink is required)
- The number of required signal-following switching circuits has been held to a single circuit, thus reducing even further the number of external components required.
- The output is a fully analog signal, and no switching noise appears on the output lines.
- Built-in standby switch (amplifier block/headphone block)
- Built-in headphone amplifier : 2 inputs/2 outputs (VG = 6dB, P_O = 60mW)
- Built-in protection circuits (overvoltage and thermal protection circuits)

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	No signal	24	V
Allowable power dissipation	Pd max	With a infinity large heat sink	15	W
Thermal resistance	θj-c		3	°C/W
Maximum junction temperature	Tj max		150	°C
Operating temperature	Topr		-25 to +75	°C
Storage temperature	Tstg		-40 to +150	°C

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Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		15	V
Recommended load resistance	R_L	Amplifier block	8	Ω
		Headphone block	32	Ω
Operating supply voltage range	V_{CC} op	The range where the package Pd is not exceeded	7.5 to 18	V

Electrical Characteristics at Ta = 25°C, V_{CC} (Pin 19), Pre V_{CC} (Pin 11) = 15V, R_L = 8Ω, f = 1kHz, Rg = 600Ω, See the specified board and circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Amplifier block]						
Quiescent current	I_{CCO}	Rg = 0	35	65	120	mA
Standby current	Ist	Amplifier off, headphone off		0	10	μA
Voltage gain	VG	V_O = 0dBm	28	30	32	dB
Output power	P_O	THD = 10%	8	10		W
Total harmonic distortion	THD	P_O = 1W, LPF = 30kHz		0.04	0.4	%
Output noise voltage	V_{NO}	Rg = 0, DIN AUDIO*1		0.05	0.3	mV
Channel separation	Chsep	Rg = 10kΩ, V_O = 0dBm, DIN AUDIO*1	50	60		dB
Ripple rejection	SVRR	Rg = 0, fR = 100Hz, VR = 0dBm, DIN AUDIO*1	60	70		dB
Input resistance	Ri		21	30	39	kΩ
Output offset voltage	Voffset	Rg = 0	-120		+120	mV
Standby control voltage	V_{ST}	Amplifier on	2		18	V
		Amplifier off	0		1.0	V
Pin 7 sink current (DDL on current)*2	I_{7Pin}	When +5V is applied to pin 7 through a 10kΩ resistor, THD = 10%	100	150	200	μA
[Headphone block]						
Voltage gain	VG	V_O = 0dBm	5	6	7	dB
Output power	P_O	THD = 10%	50	60		mW
Total harmonic distortion	THD	V_O = 0dBm, LPF = 30kHz		0.025	0.05	%
Channel separation	Chsep	Rg = 10kΩ, V_O = 0dBm, DIN AUDIO*1	60	70		dB
Ripple rejection	SVRR	Rg = 0, fR = 100Hz, VR = 0dBm, DIN AUDIO*1	75	85		dB
Input resistance	Ri		14	20	26	kΩ
Output noise voltage	V_{NO}	Rg = 0, DIN AUDIO*1		0.01	0.04	mV
Standby control voltage	V_{ST}	Headphone amplifier on	2		18	V
		Headphone amplifier off	0		1.0	V

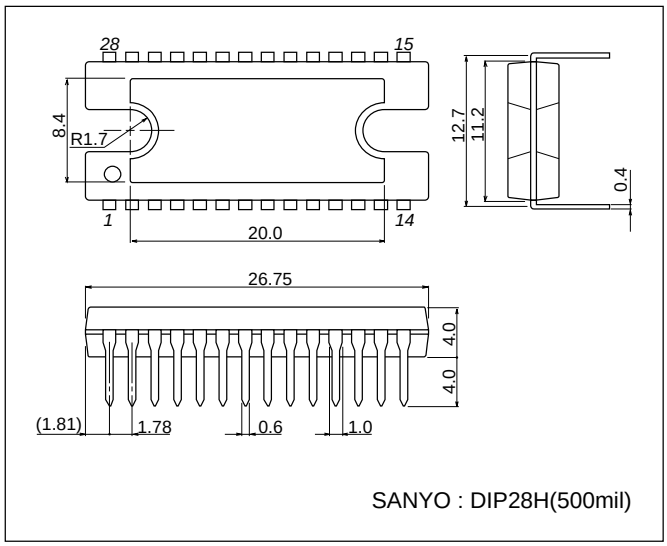
*1 : A DIN audio filter (20Hz to 20kHz) is used during testing.

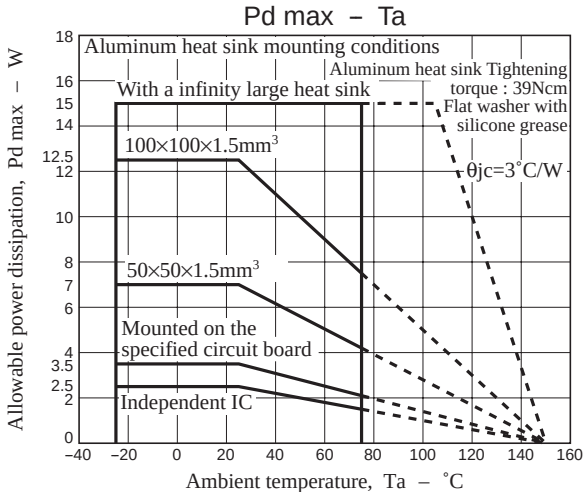
*2 : DDL : Dynamic Distortion Limiter

Package Dimensions

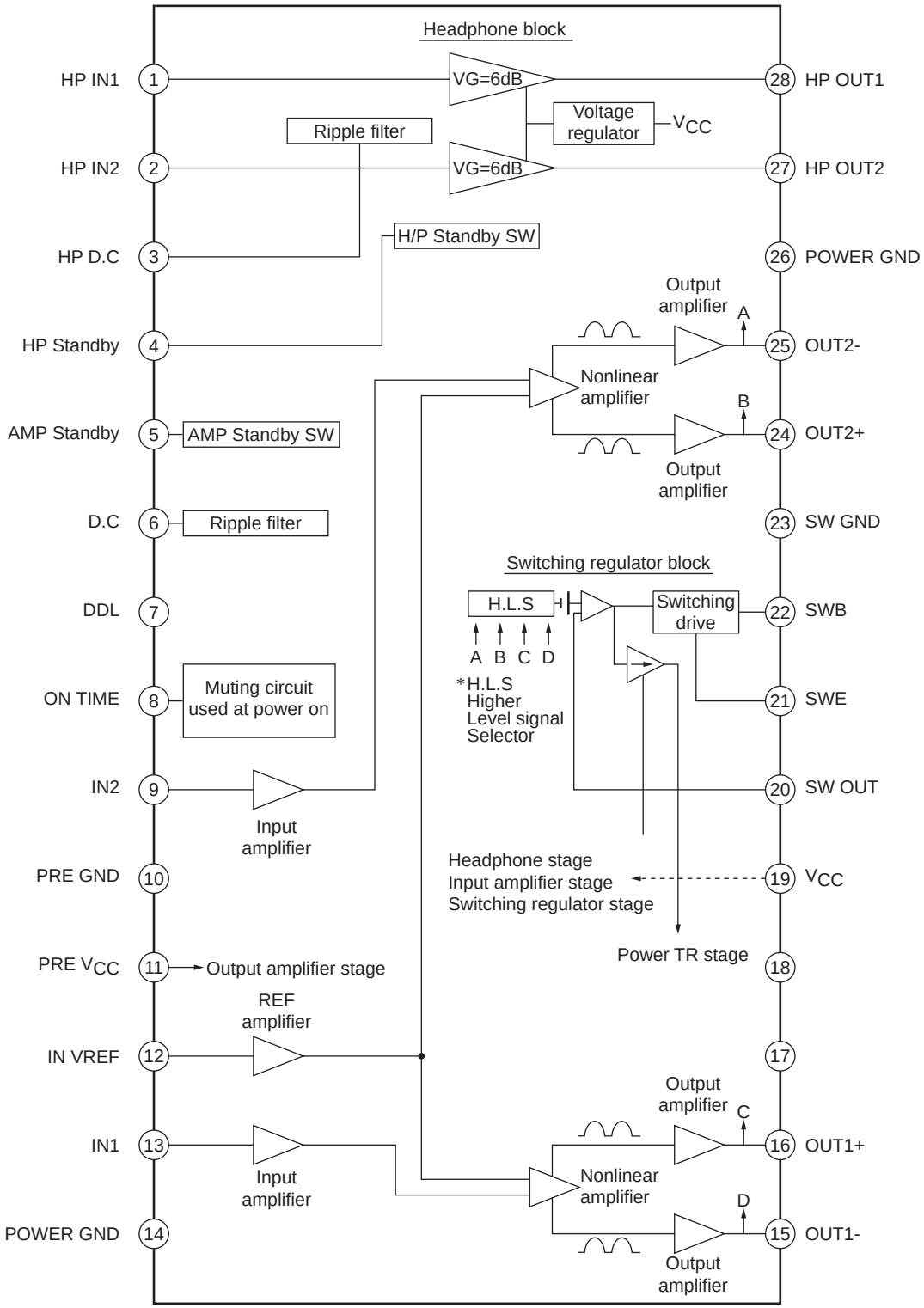
unit : mm (typ)

3147C

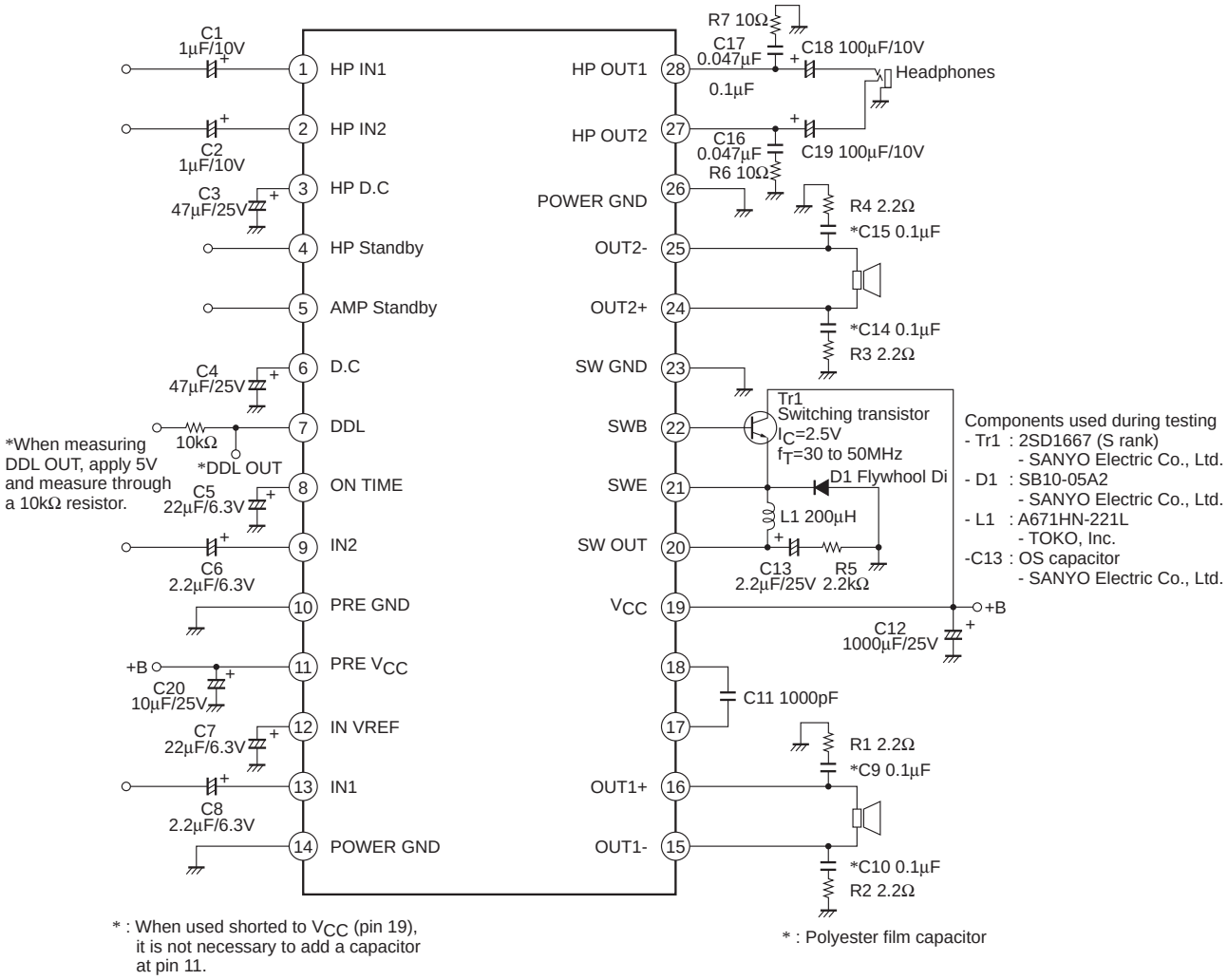




Block Diagram



Test Circuit



External Components

〈Amplifier Block〉

C4 : Ripple filter capacitor. We recommend a value of 47µF.

C5 : Sets the amplifier turn-on delay time. We recommend a value of 22µF. (The turn-on delay time for this value will be about 0.7 seconds.) While the speed with which the amplifier turns on can be increased by reducing the value of this capacitor, this can result in impulse noise. We recommend using a value of over 10µF.

C6 and C8 : Input capacitors. We recommend a value of 22µF. Note that if modified, 3.3µF or lower values should be used due to the relationship with impulse noise.

C7 : Input reference amplifier capacitor. The same value as that for C6 and C8 must be used.

C9 and C10 : Oscillation prevention capacitors. We recommend using polyester film capacitors with excellent thermal characteristics. These are used together with R1, R2, R3, and R4.

C14 and C15

C11 : Switching regulator oscillation prevention capacitor. We recommend a value of 1000pF.

C12 : Power supply capacitor

C13 : Switching regulator output smoothing capacitor. The LA4919N adopts a self-excited switching regulator technique. Since this capacitor influences the self excitation stability characteristics and the regulator efficiency, we recommend using a capacitor with a low equivalent series resistance and excellent thermal characteristics. For the same reason, resistor R5 (2.2Ω) is used together with this capacitor.

C20 : Pre-V_{CC} power supply capacitor. This capacitor is not required when used connected to V_{CC}.

Tr1 : External switching transistor. We recommend using a device with I_C = 2.5A and f_T = 30 to 50MHz. Note that if a transistor with f_T = 100MHz or higher is used, it may induce oscillation in the switching waveform. In this case, we recommend adding a base resistor of about 10Ω, and adjusting the circuit so that oscillation does not occur.

D1 : Flywheel diode to take up the energy from the coil. We recommend using a Schottky barrier diode with a low VF.

L1 : We recommend using a 200μH coil. In particular, we recommend a coil in the inductance range 180 to 220μH, a DC resistance of under 0.3Ω, and a maximum allowable current of over 0.4A.

〈Headphone Block〉

C1 and C2 : Input capacitors. We recommend a value of 0.1μF.

C3 : Ripple filter capacitor. We recommend a value of 47μF.

C16 and C17 : Oscillation prevention capacitors. We recommend using polyester film capacitors with excellent thermal characteristics. These are used together with R6 and R7.

C18 and C19 : Output capacitors. We recommend a value of 100μF.